OPHTHALMOLOGY FACING THE PROBLEMS OF VISION RELATED TO EMPLOYMENT AND REHABILITATION...

By

Gand Verriest

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OPHTHALMOLOGY FACING THE PROBLEMS OF VISION RELATED TO EMPLOYMENT AND THE REHABILITATION OF THE VISUALLY HANDICAPPED.*

G. Verriest (Gand)
Ophthalmological Clinic of the University of Gand
(Director: Prof. Dr. J. Francois)

(The solution to) the problems of orientation, selection and control (of the client aspiring to employment) is to have at one's disposal adequate methods of examination, valid criteria to determine aptitude, a sane estimation of each individual case as well as additional factors which are: necessary resources of funds, personnel and a sufficient number of subjects to be examined to make the project possible and valuable.

Concerning the methods of examination, we must first underline that it would be deeply erroneous to believe that investigations of ergophthalmological visual function are the same as those already in use in ophthalmological clinics. In the ophthalmological clinic one tries in fact to isolate what may be called elementary visual functions: visual acuity for well contrasted optotypes, well lit and situated at a distance of 5 meters; grading of peripheric acuity for a white, round, and fixed object (the kinetic perimetry is a last resource compared with static perimetry); the curve of adaptation to total obscurity for a white, well defined object after adaptation to light at standardized duration and level and covering the whole of the visual field; discrimination of spectral colors or of well defined and well presented pigmented colors under well defined lighting; deviations in relation to ideal emmetropy and in relation to ideal orthophoria strictly under diurnal conditions, and for the

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two classical distances which are 5 meters, and reading distance; lastly, when expert judgment is required, the ophthalmologist will determine only a theoretical rate of impairment in using our (Belgian) rating systems for the general work market.

To demonstrate the inadequacy of these determinations, which should be absolute, in dealing with ergophthalmology, let us take the most usual and concrete example in labor medicine, that of a truck driver. As he drives, and in case of danger, the demand of his visual acuity is not for precise details such as those of our optotype boards, but for discerning objects of a much larger size, badly contrasted in the presence of a diffuse screen of fog or drizzle; the objects to be perceived are almost constantly in relative centrifugal motion due to the speed acquired by the vehicle; there is no more question of total obscurity but there are complexes of transitory adaptation sliced by intense blinding lights more or less localized; the driver is never called upon to distinguish between juxtaposed colors but to recognize colored signals at some distance, these are not taken into account in the tests of Ishihara, Farnsworth and Nagel; the distances to which he must accommodate and converge oscillate from the dashboard to a limited distance while the ametropia may be sometimes modified by nocturnal myopia; lastly, in case of diminishing visual ability,our rates of impairment provide only for a very inexact estimate of the handicap of the driver in the performance of his work, the exenteration of one orbit being in this case, no more handicapping than the loss of vision in one eye, but a corneal membrane may be more of an impairment than another lesion estimated equally at 1 or 2%.

Also, an ophthalmological examination in a clinic is performed in a static manner as it is possible for the client to adapt, control and correct himself without limitation of time, but in a work situation, time may be of the essence, especially in the case of a truck driver, as a factor limiting the possibility of acquisition of useful information.

One can thus realize that in order to evaluate visual work ability of truck drivers in a more adequate manner it would be necessary to replace the black optotype board by optotypes having reduced level of contrast, turn again to kinetic perimetry-in spite of the recriminations of the progressist perimetrists-and, eventually, determine the visual kinetic acuity (*), replace the curve of adaptation to darkness by determining visual acuity or, even better, by differential thresholds of contrasts during and after light blinding, return to the use of lanterns rather than the Ishihara technique, the tests of Fansworth and the anomaloscope, determine the refraction and muscular equilibrium not only in daytime conditions but also in twilight conditions; it would also be necessary to make sure that the delay of response is strictly limited for all these tests.

In addition, the examination methods which we have just suggested for a better evaluation of visual aptitude of truck drivers are not appropriate for determining the visual aptitude in other forms of employment. Take for example the case of the sorters of cotton, paper, diamonds, pearls. In these cases static visual acuity becomes necessary, differentiation between almost similar shades of

(*) The French firm A.F.I.M. has just put on the market an apparatus which makes possible the easy measurement of "dynamic" visual acuity (that is to say kinetic visual acuity), using Landolt rings activated with a circular motion at an adjustable speed.

colors, resistance to accommodation stress and convergence, which must be excellent, while it is not necessary to attach much importance to the peripheral visual field and the adaptation to darkness. A solderer of electronic circuits needs a good static visual acuity, he must distinguish between resistances and condensers in function of their color code, and have a good differentiation of reliefs. Otherwise, for a roofer, all that is needed is a good visual field and a good oculomotor equilibrium.

That is to say that just as the office of the clinical ophthalmologist, the centers for vocational orientation and the labor medical services, are ill-equipped to effectuate a vocational selection which is justified and polyvalent.

It is a tragedy that the criteria by which the visual examinations are judged are as primitive as arbitrary in view of industrial production and of the possibility of preventing accidents on the road or at work. Let us demonstrate this hypothesis using once again the case of the truck driver but this time taking into account the age of the applicant.

Let us suppose that we have at our disposal a really adequate battery of tests and that the accepted standards have been established based on a population of young normal subjects. Under such conditions one would be tempted to eliminate the older driver, not only because senescence tends to increase the time of reaction, but also because of the senile changes occuring in the crystalline which tend to affect especially the differential threshold of contrast, the resistance to light blinding, as well as the threshold

of perception of colors and, of course, accommodation.

Would it therefore be justifiable to eliminate from the market a large proportion of the aging drivers because of a diminished visual performance? Certainly not, as one knows, if we omit obvious cases of mental senility, aged subjects due to their experience and wisdom have less accidents than teenagers with a piercing vision but a boiling and often aggressive temper (*). Thus the visual aptitude is only one aspect of vocational aptitude and its appreciation must be thought of in the context of other parameters, especially psychological parameters: to be valid in the content of vocational orientation and selection the visual examination must be integrated not only in the medical examination but in a psychomedico-social examination. Alas! the relationship of sensory factors to other factors can only be translated with difficulty into concrete vocational aptitude criteria.

Let us underline that the duty of the vision specialist is not only to better define the true vocational counter-indications but also to limit these counter-indications by modifying the work conditions, on one hand by improved lighting, and on the other by improving the sources of visual information.

Improved lighting means not only to increase the level in the rare cases where such increase is indicated - we are thinking especially of nocturnal lighting of the roads - but also to increase the

(*) Also in aging subjects, the correlation between visual static acuity and accidents is more evident than in young subjects in whom this correlation is practically null. (R. Henderson, 1st International Congress on Vision and Road Safety, Paris, January 1975.)

quality of lighting: avoid light blinding, grading of diffuse or directional lighting, avoid blinking and other factors of visual fatigue, remedy the monotony of modern architecture by judiciously combining natural and artificial lighting.

Improving the sources of visual information, means not only to increase the size, or even better, the conspicuousness of objects whenever possible, but modify the contrasts of luminosity and color (**) or increase the visibility of shadings, but also eliminate the parasitary sources of information and avoid that certain categories of visually handicapped persons be deprived of certain information, for example avoidance of details which can only be perceived in scotopic vision, avoid colored signals which may not be recognized by protanopics and deuteranopics by a more carefully selected choice of colors, or by adding acoustical signals to light signals.

It is only at that price that we can hope to expand the visual aptitude criteria without impairing productivity and security, and it is only at that price that a larger vocational scope may be offered to the visually handicapped.

As it is the case for the non-visually handicapped much remains to be done to establish the vocational aptitude of the visually handicapped.

To start with, we are still very far from a valid delineation of what constitutes a non-visually handicapped from a visually handicapped, that is to say the amblyope who deserves the status of

(**) Especially by the use of fluorescent substances and the new retro-reflecting surfaces composed of a multitude of glass micro-bits glued to a metallic reflector.

handicapped and should thus receive social assistance. For the National Fund for the Social Rehabilitation of the Handicapped, and for the Social Prevention Services, it is necessary to have at least 30% of permanent disability; for the Sickness-Invalidity Insurance, for Family Assistance, and for Income Tax purposes, etc. it is necessary to have at least 66% of permanent invalidity, in order to benefit from other advantages it is necessary to have a handicap of 80 or 100%. All that in itself is incoherent, but in addition, largely devoid of common sense due to the fact that the rates of handicap which we establish in Belgium with the existing scales, are estimates based on the general labor market, increased by a certain percentage based on disfigurement, and not on an estimate of vocational handicap taking into account the mode of employment of the subject. This is a serious lacuna, pregnant with practical consequences, and we could follow the example of Italy where a distinction is made between vocational handicap and patrimonial handicap, but where the possibilities of rehabilitation are taken into account. Elsewhere, in civil accident litigations as well as in labor accident litigations and under the Social Prevention System, the compensation of the victim should consist less in the payment of a certain sum of money, which is a premium to inactivity, than in promoting the means of overcoming the handicap whenever the victim is able to be rehabilitated.

Moreover, the problems of vocational orientation, selection and control of the visually handicapped are not only the same as for the non-handicapped, but there are also more problems concerning the future readaptation to a concrete task.

What up to that point I wanted to underline is the inadequacy of our instrumental resources and how our decisions concerning the aptitude or the lack of it in our clients are arbitrary.

What needs to be accomplished during the next decades is the perfecting of test batteries adapted to the various forms of employment and to the various groups of subjects, then confront the obtained results with the (satisfactory) performances on the one hand, and on the other with the ratio of unsatisfactory performances and work accidents, in order to establish valid criteria; of course, such studies would be even more valid if they would cover a larger number of subjects, which implies that it would be preferable to call upon international cooperation, and also, they can only be realized by teams consisting of vision specialists, applied psychology specialists and ergonomy specialists.

Even in Belgium, one can almost do nothing to improve the methods of examination and the criteria of vocational aptitude because our country is characterized by an almost total lack of research centers dealing with these problems. But in the Netherlands, there are two large institutes, one at Soesterberg and the other at Eindhoven exclusively devoted to the theoretical and practical problems of perception; in Belgium, there is generally not even a chair of sensory physiology in the universities, and the teaching of ophthalmological problems related to labor medicine consists only of a few hours per year; the rare persons concerned with such problems are autodidactic loners almost entirely deprived of research funds.

Isolation (of the practitioner) may constitute the most serious problem. In fact, the practice of basic or applied sensory physiology implies necessarily on the one hand the knowledge of the

physical properties of stimuli, and on the other the knowledge of physiology, and thirdly, the science of administering tests; a sensory physiology team must include at least a physicist(**), a specialist (a medical specialist) of vision (or audition) and a M.S. in applied physiology. Personally, I have sometimes been able to call upon photometric laboratories and at other times I was helped by a physiologist, but I know that I will be unable to do anything of real value unless we are a team of three.

As long as it is an ophthalmological society who, so obligingly, afford us the opportunity to present this report on visual vocational aptitude, it is our duty to "break spears" concerning the participation of ophthalmology to the applied science which is visual vocational aptitude and, placing ourselves on a more general plan, to insist upon the dangers to ophthalmology itself presented by the lack of interest in visual problems. It is true that in continental Europe there are ophthalmologists such as Gramberg-Danielsen, Schober, Merte and Mrs. Aulhorn in Germany, like Messrs. Dubois-Poulsen and Perdriel in France, like Rene Hermans in Belgium, who have not spared any effort in contributing to the knowledge of these problems, but such is not the case in the Anglo-Saxon countries, where the optometrists have purely and simply replaced the ophthalmologists in these subjects of concern; it is sufficient to glance at the English language references in the bibliography (missing) of our report to realize that the major part of the important works has been published in such periodicals as the Journal of the American Optometric Association, the American Journal of Optometry, the Optician, the British Journal of Physiological Optics. If the

(**)Physician in French means physicist not M.D.

ophthalmologists of occidental Europe do not want to be confined, in their turn and in a very near future, to the work of diagnostic, medical treatment and surgery of ocular pathology - everyone knows that it is not an illusory danger - they must not only concern themselves, in a more serious manner, with refraction and oculomotor equilibrium, but they must also interest themselves in vision at the level of university teaching and, as well, in theoretical and practical application research programs.

Moreover, these practical applications concern not only the methods of visual examination, the criteria for visual aptitude, and the improvement of task visibility, but also the visually handicapped. More than ever, the task of the ophthalmologist is not completed in dealing with cases of stabilized visual deficiency which cannot be medically or surgically improved. It is especially so in case of partial loss of vision, as the optical equipment for the visually handicapped on one hand, and the pleoptic treatment of defective vision on the other, are essentially ophthalmological disciplines, in spite of the fact that, alas! so few ophthalmologists are interested in them. Just as with orthoptics, these are disciplines which will inevitably be practiced by optometrists or other para or extra-medics if the lack of interest on the part of the ophthalmologists in this subject should continue. It is already too late in certain countries, but it may not be too late in our country as was evidenced by a salutary reaction concerning corneal lenses, on the part of Belgian ophthalmologists. But it goes without saying, that the functional rehabilitation of the visually handicapped is like other problems of vocational aptitude, an interdisciplinary domain where nothing can be accomplished without close cooperation

of the ophthalmologists, the psychologists and the educators.

Nevertheless, it goes without saying that just as the ophthalmologists can only compete with the opticians in the domain of eyeglasses and corneal lenses if their performance is competitive or better, in the field of precision of these optical corrective devices, and if they do not scamp this type of work, ophthalmology will be able to oust optometry in the domain of visual examination and care of the visually handicapped only if the ophthalmologists do not content themselves with enouncing general principles, but if they participate effectively to the development of experimental research and to the refining and application of concrete disciplines. Moreover, our medical experience in human physiology and pathology would enable us to bring a yet unknown dimension to the other members of the research team. In spite of the difficulties which are at present affecting the scientific budgets, it is on this wish that I end this plea for the participation of numerous ophthalmologists in vision research in Belgium and foreign countries.

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